

VERY DENSE SRAM CIRCUITS

ABSTRACT OF THE DISCLOSURE

An SRAM cell eliminates the p-channel pull-up resistors to decrease its physical size. A tracking circuit generates a control signal used to ensure that the memory state is preserved during the idle state. The control signal controls the wordline voltage during the idle state to vary the leakage through the access transistors to ensure that current into the node through the access device is not exceeded by leakage current out of the output nodes through the storage devices. The tracking circuit control signal can also be used to vary the well to substrate bias voltage of the storage devices to decrease the leakage through the storage devices. The control signal can also be used to bias the supply rail voltage to which the storage devices are directly coupled to decrease the amount of leakage through the storage devices. The tracking circuit comprises a number of half configured memory cells that are placed in a state which mimics the stored state in a normal memory cell that would degrade during the idle state. A differential amplifier detects when the output state of the dummy cells have fallen below a predetermined reference voltage. The differential amplifier generates the control signal at a level required to restore the output state to at or near the reference voltage.